

UNCLASSIFIED
OPERATING SPECIFICATIONS
FOR THE
241-AN, AP, AW, AY, AZ & SY TANK FARMS

0050759

Tank Farm Plant Engineering

The original signatures are on file.

PCA Incorporated: TF-98-202		<u>PCA</u>	<u>N/A</u>
Procedure Signatures for OSD-T-151-00007 H-21		TYPE OF CHANGE	REVIEW DESIGNATOR
USQ Screening Number TF-96-0390			
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Justification: Clarification, that level needs to be at least 6 inches.			
Summary of Changes:			
Page 8: Added "at least" to ** note in 7.2.2.a.			

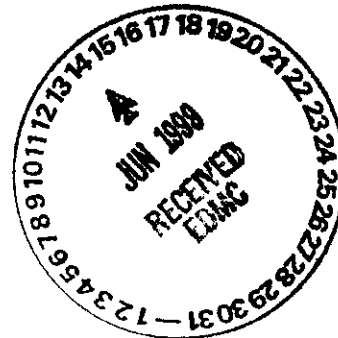


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7.1 INTRODUCTION

Operating specifications are limits and controls imposed upon a process or operation which, if violated, could damage equipment or facilities, hamper operations, jeopardize compliance with environmental requirements, or adversely affect product quality.

The operating specifications in this section cover all processing and storage operations for the 241-AN, AP, AW, and SY Tank Farms. Tanks in 241-AY and AZ (aging-waste operations) are included under these operating specifications, and in OSD-T-151-00017.

The detailed requirements and authority for preparing, reviewing, releasing, and revising operating specifications are covered in WHC-IP-0842, Volume IV, Section 4.3, *Operating Specification Documents (OSD)*.

The following organization titles are used in this document. These titles describe the general function of the organization. Exact titles for these organizations or equivalent organizations may be different and should be substituted where applicable.

Tank Farm Operations (East or West)

Tank Farm Engineering (East or West)

Process Engineering

Radiological Control (health physics)

Nuclear Safety

Industrial Hygiene & Safety

Quality Assurance

Violations of specifications shall be reported immediately to the manager of Tank Farm Operations by the responsible supervisor, and to the managers of Tank Farm Engineering, Process Engineering, Nuclear Safety, and Quality Assurance. If additional reporting is required, as determined by Tank Farm Operations, it shall be made in accordance with WHC-IP-0842, Volume II, Section 4.6.2, *Occurrence Reporting and Processing of Operations Information*.

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Sections 7.1 and 7.2 describe the specification limits to be used for the safe and efficient operation of the 241-AN, AP, AW, AY, AZ, and SY underground storage tanks. Equipment directly involved with this section is referenced in the engineering drawing index for each project. The AW Tank Farm Drawing index is found in Drawing H-2-70300, the AN Tank Farm drawing index is found in Drawing H-2-71900, the AP Tank Farm drawing index is found in Drawing H-2-90435, the AY Tank Farm drawing index is found in Drawing H-2-64300, the AZ Tank Farm drawing index is found in Drawing H-2-68400, and the SY Tank Farm drawing index is found in Drawing H-2-37700. The specification limits in this section are set to prevent excessive corrosion and minimize structural stresses that the tanks and associated facilities are subjected to during operation. Also included are limits that restrict gaseous discharges to the environment.

Copies of all basis letters are found in SD-RE-TI-008, SD-WM-TI-047, SD-WM-TI-150, SD-RE-TI-041 and SD-RE-TI-064, which are available from the Engineering Document Control Group. Copies of manuals and other documents referenced as bases are available from Operating Document Control.

NOTE: In some sections no basis letters or retrievable documentation exists, therefore, specification limits for one or more farms not specifically listed is assumed valid. The basis for the specific assumption is developed in the "Basis for Limit" section.

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7.2 UNDERGROUND STORAGE TANKS SPECIFICATION

7.2.1 TANK COMPOSITION

7.2.1.A Temperatures ($T \leq 212^{\circ}\text{F}$)

<u>Variable</u>	<u>Specification Limit</u>
-----------------	----------------------------

For $[\text{NO}_3^-] \leq 1.0\text{M}$:

$[\text{OH}^-]$	$0.010\text{M} \leq [\text{OH}^-] \leq 5.0\text{M}$
-----------------	---

$[\text{NO}_2^-]$	$0.011\text{M} \leq [\text{NO}_2^-] \leq 5.5\text{M}$
-------------------	---

$[\text{NO}_3^-]/([\text{OH}^-] + [\text{NO}_2^-])$	< 2.5
---	---------

(for solutions below 167°F , the $[\text{OH}^-]$ limit is 8.0M)

For $1.0\text{M} < [\text{NO}_3^-] \leq 3.0\text{M}$:

$[\text{OH}^-]$	$0.1 ([\text{NO}_3^-]) \leq [\text{OH}^-] < 10\text{M}$
-----------------	---

$[\text{OH}^-] + [\text{NO}_2^-]$	$\geq 0.4 ([\text{NO}_3^-])$
-----------------------------------	------------------------------

For $[\text{NO}_3^-] > 3.0\text{M}$:

$[\text{OH}^-]$	$0.3\text{M} \leq [\text{OH}^-] < 10\text{M}$
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$[\text{OH}^-] + [\text{NO}_2^-]$	$\geq 1.2\text{M}$
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$[\text{NO}_3^-]$	$\leq 5.5\text{M}$
-------------------	--------------------

7.2.1.B For High Operating Temperatures ($T > 212^{\circ}\text{F}$ for AY and AZ tanks) - section 7.2.1.A temperature limits apply with the exception that OH^- concentration must be $< 4\text{M}$.

NOTE: LCO 3.3.2 restricts the waste temperature to 195°F for the upper 15 feet of waste and 215°F for waste below 15 feet.

7.2.1.C Section Deleted

7.2.1 TANK COMPOSITION (Cont.)

Basis for Limit: See SD-WM-TI-150, "Technical Basis for Waste Tank Corrosion Specification," and TWRS-PP-94-025, "Sludge Washing Materials Study: The Behavior of Carbon Steel in a Dilute Waste Environment". The nitrite, nitrate, and hydroxide concentrations are limited in order to inhibit uniform corrosion rates and stress corrosion cracking (SCC). If these phenomena are not controlled, deterioration of the primary tank will occur at a faster rate. Failure of these systems may occur under conditions that are out of specifications.

Detection/Control: The tank contents must comply with the given composition limits. Tank inputs will be controlled so that the tank contents comply with the composition limits. Verification of compliance with composition limits is not necessary for transfers from catch tanks containing waste previously in or verified to comply with double-shell tank composition limits, or condensate from double-shell tanks. For all other transfers, it shall be verified that the composition limits in the receiving tank will not be exceeded prior to transferring additional waste into a tank.

Recovery Action: Stop all transfers associated with the affected tank. If the tank content concentrations are violated, the Tank Farm Operations shift manager shall notify the managers of Tank Farm Operations and Tank Farm Engineering. Make additional notifications per WHC-IP-0842, Volume II, Section 5.10. Recovery actions shall include adjusting the concentrations to inhibit uniform corrosion rates and stress corrosion cracking.

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7.2.2 LIQUID LEVELS

<u>Variable</u>	<u>Tanks</u>	<u>Specification Limit</u>
a. Primary Tank Liquid Level***	AN, AP, AW and SY	Min: 6 in.**
	AY, AZ	Min: 64 in.*

* When the annulus ventilation system is operating. When the annulus ventilation system is not operating, the absolute minimum liquid level required is that level necessary to meet the hydrostatic head limitation discussed in OSD-T-151-00017 Para. 17.2.3 .

** The ventilation system shall not be operated unless the liquid level is at least 6 in.

*** Liquid level is defined as the surface level irrespective of the amounts of sludge, supernate or solids/crust.

Basis for Limit: See HW-39432 and HW-81666 for minimum liquid levels. A minimum liquid level is set to provide extra protection against any bottom uplifting of the tank's steel liner.

Detection/Control: Each tank is provided with an automatic liquid level measuring device and/or manual tape. The level reading is transmitted to either the tank monitoring and control system (TMACS) or to the computer automated surveillance system (CASS) located in the control room in building 2750-E, or it is recorded on data sheets. In addition, some tanks are provided with a high level alarm probe. A manual liquid level tape/zip cord reading may be taken at each tank as a backup to the automatic liquid level gauge. Like the automatic liquid level gauge, the manual liquid level tape measures liquid level through conductivity.

Recovery Action: If the OSD limit is violated, the managers of Tank Farm Operations and Tank Farm Engineering shall be notified. Recovery actions include the addition of water and waste and/or manipulation of the primary exhaust system. If a surveillance requirement is violated, management shall take immediate corrective action to resolve the failure to perform the surveillance requirements.

7.2.2 LIQUID LEVELS (Cont.)

<u>Variable</u>	<u>Tanks</u>	<u>Specification Limit</u>
b. Leak Detection	AN and AW	≤66 in.
Pit Liquid Level	AZ and SY	≤74 in.
	AY	≤79 in.
	AP	≤55 in.
c. Encasement Leak		
Detection Pit		
Liquid Level	AY & AZ	≤408 in.

A level exceeding the specification will allow liquid to back into the drain slots in the structural slab. Flooding of the structural slab could cause a hydrostatic uplift pressure on the primary and secondary steel tank bottoms and therefore cause structural stress to the tank liners. The detection of a radioactive material leak at a liquid level above the specification would take a longer time because the material would not readily drain to the leak detection pit where radiation detection instrumentation is located.

Basis for Limit: The leak detection pit liquid level corresponds to the bottom elevation of the drainage slots in the concrete foundation. See SD-RE-TI-008, page 18, for AW and AN tanks. See SD-RE-TI-008, page 28, for AY, AZ, and SY tanks. See SD-RE-TI-008, page 13, for AP Tanks.

In the encasement leak detection pits, a level exceeding the specification will cause liquid to flow into the side-fill transfer line encasements (see drawings H-2-64317, H-2-64428, H-2-67248 and H-2-68366). The detection of a leak of radioactive material could be delayed, since the material will not drain into the leak detection pit where the radiation monitoring equipment is located.

Detection/Control: Dip tubes are used to monitor the liquid level in the leak detection pit. The weight factor transmitter activates an alarm at the respective tank farm's instrument building if the liquid level exceeds a predetermined level. This level is 36 in. for AN, AP, and AW tank farms, 30 in. for AY and AZ tank farms, and 25 in. for SY tank farm.

Recovery Action: Recovery from a liquid level above the specification maximum requires reducing the liquid level by transferring a portion of the waste to a waste storage tank.

7.2.3 HYDROSTATIC HEAD

<u>Variable</u>	<u>Tanks</u>	<u>Specification Limit</u>
Minimum Hydrostatic Head	AY and AZ	0 in. w.g.

Basis for Limit: See SD-RE-TI-008, SD-RE-TI-041 and SD-RE-TI-064 for hydrostatic head specification limits. The minimum hydrostatic head is limited to prevent high stress to and possible uplifting of the tank bottom, jeopardizing tank integrity.

Detection/Control: Each tank is provided with liquid level measurement equipment. Minimum hydrostatic head is conservatively obtained by adding the primary tank vapor space pressure and the liquid level. Tank pressure strip charts are maintained by Tank Farm Engineering .

Recovery Action: If this requirement is violated, all transfers from the affected tank shall be terminated. Hydrostatic head below the minimum shall be increased by manipulation of the ventilation system and/or the addition of water or waste.

If the OSD limit is violated, the Tank Operations shift manager shall notify the managers of Tank Farm Operations , Tank Farm Engineering, and Nuclear Safety.

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7.2.5 VAPOR SPACE PRESSURE

No Limits Currently Specified

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7.2.6 SOLUTION TEMPERATURES FOR AN, AP, AW, AY, AZ, AND SY TANKS

<u>Variable</u>	<u>Specification Limit</u>
a. Maximum Temperature of Waste in Tanks	See LCO 3.3.2*
* Maximum temperature limits for waste are provided by LCO 3.3.2 (HNF-SD-WM-TSR-006).	
b. Temperature Changeover Time for Solution in	<125°F: ≤10°F/hr* ≥125°F: ≤20°F/day*
* Average bulk temperature. These temperature constraints are not applicable during initial tank filling (see SD-RE-TI-008, page 54 and 55).	
c. Temperature Gradients of Solution in Tanks	
1) Solution	≤55°F/ft
2) Solution/Vapor Interface	≤55°F/ft

Basis for Limit: See SD-RE-TI-008, page 18 for AW Tanks, page 29 for AN Tanks, page 13 for AP Tanks, and OSD-T-151-00017. Waste temperatures are limited to prevent excessive stress to the primary tank and structural degradation of the concrete shell. High temperatures, rapid temperature cycling and extreme temperature gradients can cause concrete deterioration and cracking.

Detection/Control: Thermocouple trees are located in the AP, SY, AW, and AN primary tanks. Liquid, vapor, and solid temperatures can be read in the Tank Farms Instrument Building by use of a potentiometer. Selected thermocouple readouts are located in the 242-A Evaporator for AW and AN tanks, and in the 242-S Evaporator for SY tanks. AP tank temperatures are monitored by the microprocessor in the 271-AP Instrument Building. Tanks AY and AZ also have thermocouple probes (Refer to OSD-T-151-00017 for requirements when AY or AZ tanks contain aging waste. The requirements of this section apply otherwise). During transfers, tank temperatures are monitored closely to avoid violating the specifications.

Recovery Action: Control of high waste temperatures may involve the manipulation of the ventilation system, and/or addition of dilution.

7.2 OPERATING SPECIFICATIONS (Cont.)7.2.7 CONCRETE TEMPERATURE

<u>Variable</u>	<u>Specification Limit</u>
a. Temperature Change	< 125°F: $\leq 10^{\circ}\text{F/hr}$ $\geq 125^{\circ}\text{F}$: $\leq 20^{\circ}\text{F/day}$
b. Temperature Gradient	$\leq 35^{\circ}\text{F/ft}$ $\leq 18^{\circ}\text{F/ft}$ (AY & AZ)

NOTE: The vermiculite insulating concrete, which is considered a castable refractory, is exempt from concrete temperature limits.

Basis for Limit: See SD-RE-TI-008, pages 7 and 78, for AN, AW and AY Tank basis. For AP Tank basis see SD-RE-TI-008, page 13, and for SY Tank basis see SD-RE-TI-008, page 31. Concrete temperatures are limited to prevent structural degradation of the concrete. High temperatures, rapid temperature cycling, and extreme temperature gradients can cause concrete deterioration and cracking.

Detection/Control: Thermocouples are located as pairs in the concrete dome and walls, and spaced singly in series in the concrete foundation and the insulating concrete, except for AY and AZ (see OSD-T-151-00017 for requirements when AY or AZ tanks contain aging waste. The requirements of this section apply otherwise). They can be read using a potentiometer in each of the Tank Farm Instrument Buildings.

Recovery Action: Concrete temperatures in violation of the specification limits may be controlled by manipulating the temperature of the stored wastes. Manipulation of the stored waste temperature may involve operation or shutdown of the steam coil in AY and AZ only, addition of dilution, and/or manipulation of the ventilation system.

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7.2.12 TOTAL FUEL CONCENTRATION

<u>Variable</u>	<u>Specification Limit</u>
Max. Total Fuel Concentration (Energetics)	480 joules/g

Basis for the Limit: The above limit is found in several documents: Tank Safety Screening DQO (Hunt 1995), Organic DQO (Buckley 1995), and the Crust Burn/Flammable Gas DQO (Johnson 1994).

Exceeding the total fuel content indicates that the tank may meet the criteria for the organic or flammable gas Watch List. Waste which exceeds the total fuel concentration value could sustain propagating chemical reactions at elevated temperatures, reduced moisture levels and/or the presence of initiating events (spark sources).

Detection/Control: Waste samples are analyzed per the appropriate sample analysis plan (SAP).

Recovery Action: Stop ALL on-going work in affected tank. Contact the managers of Tank Farm Operations and Tank Farms Engineering. Do not release ANY further work packages associated with this tank until the proper tank controls are evaluated and implemented.

Make notifications per WHC-IP 0842, Volume II, Section 5.10.

This specification is an actual level that triggers an evaluation by Tank Farm Engineering. Based on the results of this evaluation, Tank Farm Operations will determine the Occurrence Reporting requirements per WHC-IP-0842, Volume II, Section 4.6.2.

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7.3 VENTILATION SYSTEM - INTRODUCTION

This section describes the specification limits to be used for safe and efficient operation of the 241-AN, AP, AW, and SY ventilation systems. Equipment directly involved with this section is referenced in engineering drawings, which are catalogued under Heating, Ventilation, and Air Conditioning (HVAC) in the drawing index for each tank farm: H-2-70300 for AW farm, H-2-71900 for AN farm, H-2-90514 for AP Farm, and H-2-37700 for SY farm.

The ventilation system for the AW, AN, AP, and SY tank farms consists of "K1" and "K2" subsystems. The "K2" subsystem is used to ventilate the annuli for each tank. The "K1" ventilation subsystem is used to cool the primary tank and to minimize radioactive vapor releases from the primary tank to the atmosphere by keeping a vacuum on the tank. In SY tank farm, the tanks will be ventilated by the "VTP-EF-3102" system with the "K1-4-1" system as the backup and a portable exhaustor (P-28) available. The "K2" ventilation subsystem is used as a means of cooling the storage material and thus keeping the primary and secondary tanks within temperature specification limits. Of prime consideration is regulation of the concrete temperature in each tank.

For AY and AZ tanks, the primary tank vapor space is ventilated by the 702-A system, which is covered in OSD-T-151-00016. The AY and AZ annulus ventilation systems are also covered by that specification.

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7.3.1 GENERAL REQUIREMENTSVariableSpecification Limit

7.3.1.A HEPA Filters

1) Pressure Drop Across
Filters at Rated Flow

- a) Pressure drop across
first filter in a series ≤ 5.9 in. w.g.*
- b) Pressure drop across
any other filter ≤ 4.0 in. w.g.*
- c) Total pressure drop
across filters in a
series ≤ 5.9 in. w.g.

* These limits protect an assumption in the Basis for Interim Operation (BIO) accident analysis, Section 5.3.2.4.3 (HNF-SD-WM-BIO-001). Do not modify or delete these limits without verifying the Authorization Basis assumption is still protected.

Basis for Limit: See SD-RE-TI-008, page 44, and WHC-CM-7-5 for detailed basis. High-efficiency particulate air (HEPA) filters will fail if the pressure drop across them becomes too great. The specification limits are well below the design limits of 10 in. w.g. pressure drop.

Detection/Control: Calibrated differential pressure gauges are used for each filter to monitor the pressure drop. The gauges are checked per Standard Operating Procedures (SOPs) TO-060-105 and TO-060-104 for AW Farm, TO-060-101 for AN Farm, TO-060-340, TO-060-341 for AP Farm, TO-060-230, and TO-060-240 for SY Farm. Gauges are read daily. Data sheets are maintained by Tank Farm Engineering.

Recovery Action: If the pressure drop across a filter or across filters in a series should exceed the specification limits, it shall be taken out of service and replaced. If the total pressure drop across a series filter assembly should exceed 10 in. w.g., response shall be in accordance with WHC-IP-0842, Volume II, Section 4.6.2.

<u>Variable</u>	<u>Specification Limit</u>
7.3.1.B Air Inlet Temperature to HEPA Filter	≤230°F

Basis for Limit: The manufacturer gives the maximum operating temperature as 250°F; see SD-RE-TI-008, page 44. The 230°F specification limit was chosen to provide an increased safety margin. Excessive temperatures in the air stream will cause weakening of the filter gaskets and lead to filter failure. If a failure occurs, equipment may become contaminated and radionuclides may be released to the atmosphere in quantities above the Derived Concentration Guide (DCG) value for the public; DCG-Public exposure limits (WHC-CM-7-5).

Detection/Control: Temperature controllers located at the air heaters of the HVAC system provide regulated air temperatures. Temperature indicators are calibrated as stated in the preventative maintenance/surveillance system (PM/S) and checked to determine the operating condition of the heater per applicable procedures, work plans, work packages or other documentation.

Recovery Action: If these requirements are violated, waste transfers shall be immediately terminated and the Tank Farm Operations shift manager shall notify the managers of Tank Farms Operations and Tank Farms Engineering .

If a failure occurs during a normal operation to the primary system, the fans shall be switched over to the standby system.

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<u>Variable</u>	<u>Specification Limit</u>
7.3.1.C Filter Efficiency	
1) Single HEPA Filter System	99.95% of particles between 0.1 μm and 3.0 μm , and of average size 0.5 μm , are removed per filter.
2) Multiple HEPA Filter System	99.95% of particles between 0.1 μm and 3.0 μm , and of average size 0.5 μm , are removed per filter.

Basis for Limit: HEPA filters are to have the removal efficiencies stated above in accordance with WHC-CM-7-5. Filters not removing the specified percentage of particles may release radionuclides in excess of DCG-Public Exposure limits (WHC-CM-7-5) and constitute an occupational hazard.

Detection/Control: Filters are aerosol tested to meet the above requirements. AP, AW, AN, AY, AZ and SY Farm radiation alarms are activated at the Tank Farm's Instrument Building and the Evaporator if a radionuclides release occurs. The alarm system is interlocked to shut down the HVAC system.

Recovery Action: If a failure occurs during normal operation in any one of the HEPA filters, the HVAC system shall be switched over to the spare bank. If the specification limit is violated, waste transfers shall be immediately terminated and the Tank Farm Operations shift manager shall notify the managers of Tank Farm Operations and Tank Farm Engineering .

<u>Variable</u>	<u>Specification Limit</u>
7.3.1.E Gaseous Discharges from Ventilation System	Maximum permissible concentration of radionuclides
1) Annual Average Concentrations*	Not to exceed 1 time the DCG-Public Value of WHC-CM-7-5, Appendix C, at point of release. *(see exceptions)
2) Weekly Average Concentrations*	Not to exceed 10 times the annual average administrative control value (ACV) concentration for that stack at point of release.*
3) Instantaneous Concentration	Not to exceed 5,000 times the DCG-Public Value of WHC-CM-7-5, Appendix C, averaged over any four hour period at point of release.

a. Exceptions

Stacks 296-A-17, 296-A-27, 296-A-29	Not to exceed 10 times the DCG value of Appendix C at point of release.*
---	--

(For other exceptions see compliance plans to WHC-CM-7-5.)

- * Except for krypton-85: Not to exceed a combined release of
4 E+06 Ci/yr.

Basis for Limit: The basis for the concentration limits is the Environmental Compliance Manual, WHC-CM-7-5, Appendix C, and also DOE Order 5400.1. The concentration guides are used in evaluating the adequacy of health and environmental protection measures against airborne radioactivity in occupied areas.

Detection/Control: For AW, AN, AP, and SY, the system is as follows: A Radiation Analyzer (RAN) and Effluent Record Sampler samples the air contained in the K1 and K2 Exhaust Stacks. One RAN and one Record Sampler are provided for each stack. Both the RAN unit and the Record Sampler collect particulate samples on filter paper. The sample is then analyzed to determine conformance with DCG-Public limits (Environmental Compliance Manual, WHC-CM-7-5).

Control of the HVAC System is covered by applicable procedures, work plans, work packages or other documentation.

Recovery Action: If the specification limits are violated, the Tank Farm Operations shift manager shall notify the managers of Tank Farm Operations, Tank Farm Engineering, and Radiological Control. Required monitoring and sampling shall be promptly re-established. Response to unplanned releases shall be according to WHC-ERM-001.

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